

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

REC'D 28 FEB 2005

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Applicant's or agent's file reference <b>SYN 60016/WO</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. <b>PCT/GB2004/002426</b>	International filing date (day/month/year) <b>08.06.2004</b>	Priority date (day/month/year) <b>13.06.2003</b>
International Patent Classification (IPC) or both national classification and IPC <b>C07F15/00, C07F9/02, B01J31/00</b>		
Applicant <b>JOHNSON MATTHEY PLC et al.</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☒ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  <b>10.01.2005</b>	Date of completion of this report  <b>24.02.2005</b>
Name and mailing address of the international preliminary examining authority:   <b>European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465</b>	Authorized Officer  <b>Richter, H</b>  Telephone No. +49 89 2399-8539  

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB2004/002426

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-38 as originally filed

**Claims, Numbers**

1-16 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

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**II. Priority**

1. ☒ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
- ☒ copy of the earlier application whose priority has been claimed.
  - ☐ translation of the earlier application whose priority has been claimed.
2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid.

Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-16
	No: Claims	
Inventive step (IS)	Yes: Claims	1-16
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-16
	No: Claims	

2. Citations and explanations

**see separate sheet**

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Reference is made to the following documents:

- D1: WO 01/74829 A (CHIROTECH TECHNOLOGY LTD) 11 October 2001 (2001-10-11)
- D2: US-A-5 276 053 (JOHNSON GRAHAM) 4 January 1994 (1994-01-04)
- D3: BARTHOLOMEW, GLENN P. ET AL: "Synthesis, Characterization, and Spectroscopy of 4,7,12,15-[2.2]Paracyclophane Containing Donor and Acceptor Groups: Impact of Substitution Patterns on Through-Space Charge Transfer" JOURNAL OF THE AMERICAN CHEMICAL SOCIETY , 124(18), 5183-5196 CODEN: JACSAT; ISSN: 0002-7863, 2002, XP002293803
- D4: PELTER, ANDREW ET AL: "The synthesis of homochiral ligands based on [2.2]paracyclophane" TETRAHEDRON LETTERS , 42(47), 8391-8394 CODEN: TELEAY; ISSN: 0040-4039, 2001, XP004311327
- D5: DATABASE CHEMABS [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; NOUR-EL-DIN, AHMED M. ET AL: "Chemical reactions on thin-layer chromatoplates: Part I. Reactions of nitrones and [2.2]paracyclophanes" XP002293804 retrieved from STN Database accession no. 1983:575529

The priority documents pertaining to the present application were not available at the time of establishing this Written Opinion. Hence, it is based on the assumption that all claims enjoy priority rights from the filing date of the priority document. If it later turns out that this is not correct, the document indicated in the international search report as P(X) could become relevant to assess whether the claims 1-16 satisfy the criteria set forth in Article 33(1) PCT.

The document D1 is regarded as being the closest prior art to the subject-matter of claims 1 and 11 and discloses (the references in parentheses applying to this document): Phanephos ligands and complexes therewith as well as their use as catalysts for stereoselective hydrogenation of a ketone (pages 2 and 3, claims 1-16).

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From this prior art the ligand according to claim 1 of the present application is distinguished in the presence of a substituent  $Z^1$ ,  $Z^2$  or  $Z^3$ .

Hence, claims 1 and 11 are novel.

Having regard to the description beginning at page 1, line 27 the following problems are described

1. the prior art paracyclophane ligands need to be improved in terms of activity and selectivity or the catalysts derived from them over a broad range of reactions and substrates.
2. the prior art paracyclophane ligands are not particularly amenable to immobilization on solid supports.

Having regard to the table at page 38 no particular improvement in activity and selectivity can be seen by use of the new ligands.

At least problem 2 has been solved by the ligands according to claim 1 but this effect on account of the substituents was expectable for the skilled person. Furthermore, given the known starting materials (see D-D) the preparation of the new ligands was

an easy task. Also, a substituent is known to facilitate chiral resolution (see the description, page 2, lines 15-19 and D2, column 17). With this background the ligands and the complex as claimed in claims 1 and 11 as well as the preparation thereof is considered to be obvious.

However, the presence of an inventive step can be acknowledged for these claims by virtue of the surprising fact that the field of application of the new catalysts is much broader (see claim 16) than in the prior art which only describes stereoselective hydrogenation of ketones.

Dependent claims 2-6, 8 and 12-14 define further embodiments and likewise meet the requirements of the PCT.

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Use claims 15 and 16 are acceptable in connection with novel and inventive claims 12 - 14.

Claims for intermediates 9 and 10 are novelty over D3-D5 due to the feature "carboxyl". The CHO group according to D3, the CONEt<sub>2</sub> group according to D4 and the CO<sub>2</sub>Me group according to >D5 do not meet the definition "carboxyl".

Claims 9 and 10 are inventive in connection with a new and inventive preparation process 7.